Cleistogamy in Heteranthera.—WYLIE[12] has discovered that *Heteranthera dubia* is cleistogamous, and his investigation of the situation has led him to some interesting conclusions and questions. As he remarks, this plant "has developed a vegetative body well adapted to the submersed life, as shown by its vigorous and successful growth. It has failed, however, to attain floral specialization adequate to insure cross-pollination." He finds that there is no possibility of cross-pollination, except through flower elongation, "so that if seeds are to be set with certainty and in considerable numbers, it must be through close pollination under water, excepting the relatively few flowers so situated that they can reach the air, and these also seem to have acquired the habit of self-fertilization." He suggests that this species is a favorable one for experimental study in plant-breeding, since it grows readily, and if kept submerged sets seeds freely without further attention.—J. M. C.

A living physical system.—BRIGGS'S[13] clear-cut picture of the living plant as a physical system which is absorbing energy and performing useful work is significant of the present trend of botanical thought. He suggests that the doctrine of vitalism is being restricted more and more as our knowledge of plant phenomena increases. He summarizes the situation as follows: "The mechanism of plant processes, not at present explainable on a physico-chemical basis, would be termed by the vitalistic school as 'vital,' by the physico-chemical school as 'unknown.'" He treats the subject under the following heads: (1) the efficiency of the plant system, (2) the growth rate, (3) gas exchange between the leaf and the air, (4) diffusion through perforate septa, (5) the ascent of sap. In closing he emphasizes the fact that as a means of efficiency in plant production it is important to have the fullest possible understanding of the physical and chemical processes associated with growth.—GEO. B. RIGG.

Leaf duration in evergreens.—In studies embracing 9 gymnosperms and 22 angiosperms, growing in the state of Washington, PEASE[14] has investigated the duration of leaves and has endeavored to account for the variations displayed. The leaf age limit reaches from about a single year in *Rhamnus Purshiana* to 23 years in *Taxus brevifolia*. From determinations upon approximately 100 twigs of each species grown under a variety of conditions, graphs are plotted showing the range for each. Some of the factors found to be efficient in affecting duration are (1) age, mature trees having older leaves;

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[12] WYLIE, ROBERT B., Cleistogamy in *Heteranthera dubia*. Bull. Lab. Nat. Hist. State Univ. Iowa 7:48–58. 1917.

[13] BRIGGS, LYMAN J., The living plant as a physical system. Jour. Wash. Acad. Sci. 7:89–111. 1917.

[14] PEASE, VINNIE A., Duration of leaves in evergreens. Amer. Jour. Bot. 4:145–160. *figs. 12*. 1917.

(2) shade, increasing permanency; (3) wind, tending to decrease duration; (4) moisture, tending to lengthen duration; and (5) bog habitat, causing the same early fall as dry habitat. In general, factors which cause increase in transpiration are accompanied by decrease in leaf duration, while those factors tending toward decrease in photosynthetic activity are accompanied by increased duration. The author of the paper is to be commended upon its good organization.—GEO. D. FULLER.

Physical factors in plant distribution.—The recent advances along the line of devoting more attention to the factors controlling vegetation and the progress made in more correctly evaluating these factors have been discussed by SHREVE,[15] who has also pointed out the striking contrasts in the physical conditions of mountains in humid and arid regions.[16] The contrasts in humidity are most marked, but are manifest also in temperature and light. Examples are seen in the Blue Mountains of Jamaica, with a daily temperature range of 6–10°, compared with the Santa Catalina Mountains of Arizona, with a daily range of 40–65° and corresponding annual amplitudes. These and other differences enumerated result in plant associations where a stratified rain forest in the former region, with large trees, under trees, shrubs, large herbs, and small hygrophilous plants superimposed in luxuriant profusion, contrasts with the scanty shrubs, the open pine forests, and somewhat denser fir forests, all almost devoid of any stratification whatever, which are distributed over the slopes of the latter.—GEO. D. FULLER.

Anatomy of Betulaceae.—The intensive anatomical work among the gymnosperms has forged an unusually effective weapon for attacking phylogeny, and it is beginning to be used in the interpretation of angiosperms, with very interesting results. HOAR[17] has investigated the anatomy of the Betulaceae and has come to the conclusion that the group belongs "near the base of the dicotyledons," and that *Alnus* most clearly illustrates the primitive conditions. In this genus the aggregate condition of rays is either normally developed or in a state of reduction, while in the more advanced genera (*Carpinus*, *Ostrya*, and *Betula*) the aggregate condition persists only in conservative regions or is "recalled by injuries." The conclusion of course depends upon the position of the aggregate ray in the phylogenetic series of ray structures. In the same connection *Casuarina* was investigated, the result being to confirm its low position among the dicotyledons, and also its close anatomical relation-

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[15] SHREVE, FORREST, The weight of physical factors in the study of plant distribution. Plant World **19**:53–67. 1916.

[16] ———, The physical control of vegetation in rain forest and desert mountains. Plant World **20**:135–141. 1917.

[17] HOAR, CARL S., The anatomy and phylogenetic position of the Betulaceae. Amer. Jour. Bot. **3**:415–435. *pls. 16–19.* 1916.